

Developmental Biology (Bio 136)
Mills College, Spring 2016
Lecture: M/W 11:00-12:15, GSB 110
Lab: W 2:30-5:30pm, NSB 163

Instructor: Robin Ball, rball@mills.edu
Office hours: M 9:30-11am, NSB 127, or during lab

TA and peer tutors: Chloe Annand (lab TA), cannand@mills.edu
Hailey Sounart (lecture TA), hsounart@mills.edu

Hailey is also a peer tutor, so make appointments with her to get tutoring.
There will be a weekly workshop to go over concepts and provide homework help.

Prerequisites: General Biology (Bio 1); General Chemistry (Chem 17 and 18); Bio 2 and Genetics highly recommended

Text: *Developmental Biology, 10th edition* (2013) by Scott Gilbert.

We will not be going in the same order as the textbook, so follow the reading assignments written on the lecture schedule. You will only be responsible for material covered in lecture or lab, so don't worry about the extra information in the textbook. You do not need the unique code that comes with the textbook, so feel free to get a used copy. The 9th edition will work fine, but the figure numbers and page numbers are different.

The 6th edition is available for free online: <http://www.ncbi.nlm.nih.gov/books/NBK9983/>, but only via specific topic searches. I do recommend checking out the textbook website that is provided for free access at www.devbio.com.

Another useful website about developmental biology is here:
https://embryology.med.unsw.edu.au/embryology/index.php/Main_Page

Course website: Please check the Blackboard course site regularly. You will find the lecture notes and slides here. The homework assignments and labs will be posted on this site.

Grading

7 Homeworks (8 pts each)	56 pts
6 Quizams (20 pts, lowest dropped)	100 pts
Final exam	100 pts

Harland article homework	10 pts
Lab notebook	50 pts
Poster presentation	50 pts
5 min presentation	5 pts
Ethics paper and discussion	15 pts

<u>Attendance/participation</u>	14 pts
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Total points	400 pts
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Homework

Homework questions will be posted on Blackboard about a week before the due date. Homework is due in class on the due date. Homework is intended to review concepts and vocabulary presented in class the previous week. Students are encouraged to work together on homework; however, each student must turn in work individually, and questions must be answered in your own words. Due to grading limitations, only a subset of assigned problems, chosen at random, will be graded each week. A key will be posted on Blackboard after each homework is due, so that you may check your answers on your own. Homework will be accepted a few days late, but you will lose one point for each day it is late.

Quizams

Somewhere in between an exam and a quiz, there will be 6 quizams at the start of class. The quizams will last about 30 minutes, so these are fairly extensive. The quizams are meant to help motivate you to stay caught up in the material and test yourself before the final. Your lowest quizam grade will be dropped. There are no make-up quizams.

Final Exam

There will be one cumulative final exam and no midterms. The quizams are taking the place of longer midterms. The final exam will have some short answer, fill in the blank and multiple choice questions, but the majority of the exam will be longer problems similar to the homework.

The final exam is Saturday May 7, 9am-12pm

Attendance/participation

Everyone should get all the points for attendance and participation. I expect everyone to attend lecture and lab regularly and come to class prepared to learn. This means you should be alert and focused on the course material. I will notice if you stop attending class and I will notice if you are checking your email or phone during class. This is distracting to the other students sitting around you, so please be respectful of the rest of the class. I will sometimes give you questions to work on during class, so I expect everyone to work together and to try to answer the problems.

Course aims and desired learning outcomes for students

The Biology Department has five desired learning outcomes for its majors. By the time you graduate, we would like you to:

1. Possess knowledge of general biological principles.
2. Have the ability to carry out standard laboratory techniques, including analysis of results.
3. Have the ability to communicate findings in both oral and written modes
4. Understand and practice the process of scientific inquiry, including the logic of experimentation and data analysis.
5. Have the ability to evaluate a new area of research using knowledge of biological principles and the process of scientific inquiry, as well as the current biological literature.

This course, Bio 136, is designed to allow students to practice all five of the skills represented by the desired learning outcomes. Homework and the laboratory poster presentation will help you practice communication skills, as well as data analysis and evaluation of current literature.

Accommodations:

If you anticipate issues related to the format or requirements of the course, please discuss them with me. If you determine that formal, disability-related accommodations are necessary, it is important that you register with the Office of Student Access and Support Services so that accommodations can be arranged for this course and future courses here at Mills. Please do this well before you need the accommodation, so I have time to arrange alternatives.

Student Access and Support Services: Cowell Building, Room 111

Phone: 510-430-3241, Email: ssdhelp@mills.edu

http://www.mills.edu/student_services/disability_services/index.php

Mills College Policies:

“Incomplete” grades: A grade of “Incomplete” may be temporarily assigned if a student has completed at least 2/3 of the work in the course, but is prevented from completing the coursework by *unforeseeable circumstances beyond her or his control*.

Academic Integrity: As is made clear by the Student Honor Code, the content of all submitted examinations and other assignments must represent the student’s own work unless otherwise specified (e.g. group projects). Representing another’s work as your own may result in failing the assignment or the course. For policies on academic integrity, please refer the Mills College Student Handbook 2015-2016 [<http://www.mills.edu/handbook.pdf>].

Class Schedule and Reading Assignments

The class schedule appears on the next two pages. The reading assignments are listed as well as the due dates for homework assignments and the dates for the quizzes.

You will receive a more detailed lab schedule and syllabus in lab later today.

Date	Day	Lecture Topic	Reading (10 th ed.)	Assignments
Jan 20 Lec 1	W	Introduction to study of development	p. 1-17 p. 107-113	
Jan 20 Lab 1	W	<i>Intro to lab course</i> <i>Discuss genomic equivalence and nuclear transplantation</i>	31-33 Textbook Website Topic 2.6	
Jan 25 Lec 2	M	Differential gene expression Polytene chromosomes (video)	Review Ch. 2 565-566	
Jan 27 Lec 3	W	Common cell signaling pathways in development	84-101	HW 1 due
Jan 27 Lab 2	W	<i>Polytene chromosomes of Drosophila</i>	32, 565-566 Vade Mecum video	
Gametogenesis and Fertilization				
Feb 1 Lec 4	M	Review of mitosis/meiosis Gametogenesis, spermatogenesis Sperm structure	606-610 (meiosis) 616-619, 117-120 (spermatogenesis)	
Feb 3 Lec 5	W	Oogenesis and egg structure	120-123, 610-623	HW 2 due
Feb 3 Lab 3	W	<i>Slides of mitosis and gametogenesis</i>	Vade Mecum (gametogenesis)	
Feb 8 Lec 6	M	Fertilization I	Ch. 4	Quizam 1 (covers Lec 1-5)
Feb 10 Lec 7	W	Fertilization II		
Feb 10 Lab 4	W	<i>Finish gametogenesis slides</i> <i>Discuss fertilization experiments</i>		
Feb 15	M	President's Day – No Class		
Cleavage and Gastrulation				
Feb 17 Lec 8	W	Introduction to Embryology and fate mapping. Videos for sea urchin lab.	153-161 17-23	HW 3 due
Feb 17 Lab 5	W	<i>Sea urchin lab- live sea urchin gametes.</i> <i>Effects of environment on fertilization</i>		<i>Paper choice due</i>
Feb 22 Lec 9	M	Cleavage – holoblastic	217-225, 242-245 232-234, 298-303	
Feb 24 Lec 10	W	Cleavage – meroblastic	273-275 286-287, 180-183	Quizam 2 (covers Lec 6-8)
Feb 24 Lab 6	W	<i>Fixed sea urchin embryos</i> <i>Timing of development</i>		
Feb 29 Lec 11	M	Sea urchin gastrulation	225-232	
Mar 2 Lec 12	W	Amphibian gastrulation	245-251	HW 4 due
Mar 2 Lab 7	W	<i>Gastrulation workshop</i>		<i>Choose ethics topic</i>
Mar 7 Lec 13	M	Amphibian axes determination	251-262	Quizam 3 (covers Lec 9-12)
Mar 9 Lec 14	W	Avian gastrulation and axes determination	287-298	
Mar 9 Lab 8	W	<i>Discuss journal article from Harland lab</i>		<i>5 min presentation</i>

Mar 14 Lec 15	M	Mammalian gastrulation and axes determination	303-312	HW 5 due
		Organogenesis		
Mar 16 Lec 16	W	Stem cells Introduction to organogenesis	319-331	
<i>Mar 16</i> Lab 9	<i>W</i>	<i>Field trip to UC Berkeley, Richard Harland Lab – frog development</i>		<i>Harland paper HW due</i>
Mar 21- Mar 25		Spring Break – No class		
Mar 28 Lec 17	M	Neurulation, CNS development, intro to neural crest cells	262-265, 333-345	
Mar 30 Lec 18	W	Neural crest cell migration	375-391	Quizam 4 (covers Lec 13-16)
<i>Mar 30</i> Lab 10	<i>W</i>	<i>Early development of chick I Serial reconstructions</i>	Vade mecum (Chick mid)	
Apr 4 Lec 19	M	Intro to mesoderm, somitogenesis	415-429	
Apr 6 Lec 20	W	Myogenesis and osteogenesis	429-436	HW 6 due
<i>Apr 6</i> Lab 11	<i>W</i>	<i>Early development of chick II Observe 2-3 day old embryos</i>		<i>Layout of poster due</i>
Apr 11 Lec 21	M	Cardiac development and endoderm	449-467 476-486	
Apr 13 Lec 22	W	Limb development	Ch 14	Quizam 5 (covers Lec 17-20)
<i>Apr 13</i> Lab 12	<i>W</i>	<i>Early development of chick III Bone and cartilage stain Ethics discussion #1</i>		<i>Poster text due</i>
		Focus on Drosophila and humans		
Apr 18 Lec 23	M	Introduction to <i>Drosophila</i> development Axes formation in oocyte, DV axis	Review 107-115 179-194	
Apr 20 Lec 24	W	Axes specification and segmentation	194-209	HW 7 due
<i>Apr 20</i> Lab 13	<i>W</i>	<i>Early development of chick IV Analyze stained embryos Ethics discussion #2</i>		
Apr 25 Lec 25	M	Homeotic genes	209-211	Quizam 6 (covers Lec 21-24)
Apr 27 Lec 26	W	Human development and disease	635-655	
<i>Apr 27</i> Lab 14	<i>W</i>	<i>Ethics discussion #3 Poster session #1</i>		<i>Lab notebooks due</i>
May 2 Lec 27	M	Review I: gametogenesis to gastrulation		
May 4 Lec 28	W	Review II: organogenesis to <i>Drosophila</i>		
<i>May 4</i> Lab 15	<i>W</i>	<i>Ethics discussion #4 Poster session #2</i>		
May 7	Sat	9am- 12pm: Final exam (cumulative)		